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*Office of Environmental Management – Grand Junction*

MOAB UTAH

UMTRA Project

# September 2005 Water Sampling Validation Data Package for Configuration 2 Interim Action Injection Test Sampling Moab, Utah

December 2005

U.S. Department of Energy

Office of Environmental Management

*Work Performed Under DOE Contract No. DE–AC01–02GJ79491*
*for the U.S. Department of Energy Office of Environmental Management.*

**September 2005 Water Sampling**

# Validation Data Package
# for
# Configuration 2 Interim Action Injection Test Sampling
# Moab, Utah

December 2005

# Moab, Utah

September 27-29, 2005

## Data Package Contents

This data package includes the following information:

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# Sampling Event Summary

**Site:** Moab, Utah

**Sampling Period:** September 27-29, 2005

The purpose of this sampling event was to collect data that can be used to evaluate the Configuration 2 injection system. This is the twelfth round of sampling of the injection system since the baseline samples were collected just prior to starting injection on October 6, 2004.

According to the USGS Cisco Gaging Station, the mean daily Colorado River flows during the first two days of the sampling event were 3,880 and 3,740 cubic feet per second (cfs), respectively. However, a significant rain event up-stream caused the flow rate to peak at 6,400 cfs on September 29.

Sampling and analysis was conducted in accordance with the *Operations, Maintenance, and Performance Monitoring Plan for the Interim Action Ground Water Treatment System, February 2004.* Ground water samples were collected from 10 observation wells (0401, 0408, 0580, 0581, 0582, 0583, 0584, 0586, 0588 [34 ft below ground surface (bgs)], and 0589 [44 ft bgs]), two piezometers (0590 and 0591), and two surface waters (0236 and 0240). Including one equipment blank and one duplicate, a total of 16 samples were collected.

Analysis and interpretation of the validated data presented in this package will be reported as part of a performance evaluation report on the injection system scheduled in 2005. However, to monitor performance of the injection effort, time-versus concentration graphs are included for certain key indicator wells and major contaminants of concern. Generally, contaminant concentrations continue to be suppressed by the injection of fresh water. One exception to this is well 0589; the graph shows uranium concentrations decreasing from September 2004 through January 2005. Thereafter, concentrations have increased to levels between 2 and 2.5 mg/L which is greater than first measured. This deep zone well is screened from approximately 43 to 53 feet bgs. Ammonia concentrations in well 0408 (screened 13 to 18 feet bgs) have continued to be low (approximately 200 mg/L) since February 2005. The time-versus concentration graphs for 0408 portray a different trend for ammonia and uranium in the past 3 months. Also, ammonia and uranium concentrations increased for well 0588 (screened 25 to 35 feet bgs) in the last measured month. These trends will continue to be evaluated in the successive monthly reports and a determination made if they are representative of the configuration area or just individual wells.

The data validation indicated the data meet the quality control criteria specified for this project. No significant discrepancies were noted regarding sample shipping/receiving, preservation and holding times, instrument calibration, method blanks, matrix spikes, etc., except as qualified.

John R. Ford

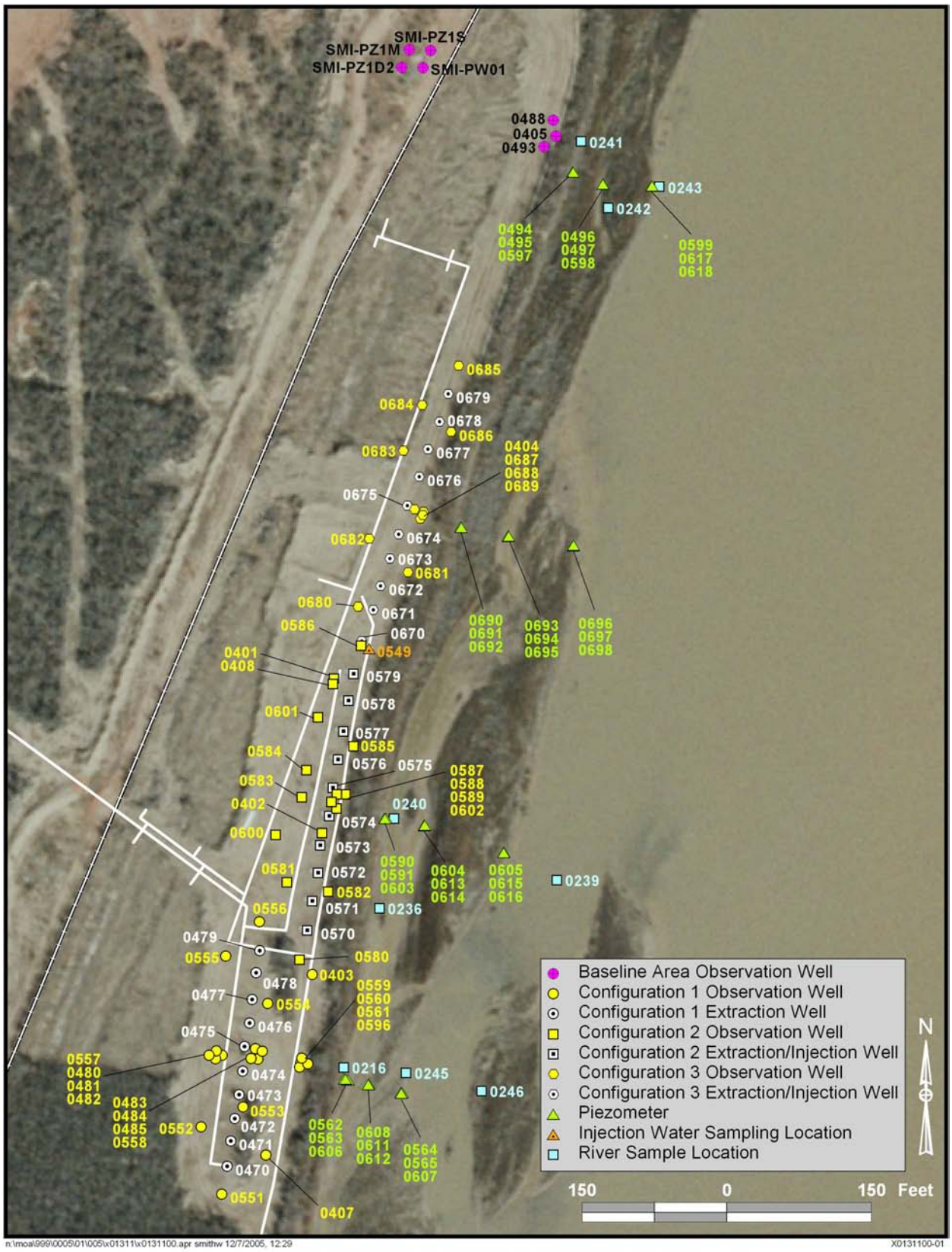
John R. Ford
Ground Water Lead

12-15-2005

Date

# Sample Location Maps

*Sample Locations at the Interim Action Well Field and Baseline Area (may include locations not sampled)*




*Existing Well Locations*

# Data Assessment Summary

# Water Sampling Field Activities Verification Checklist

| | | | |
|---|---|---|---|
| **Project** | Moab, Utah | **Date(s) of Water Sampling** | September 27-29, 2005 |
| **Date(s) of Verification** | November 23, 2005 | **Name of Verifier** | Jeff Price |

| | Response (Yes, No, NA) | Comments |
|---|---|---|
| 1. Is the SAP the primary document directing field procedures? | Yes | |
| List other documents, SOP's, instructions. | NA | |
| 2. Were the sampling locations specified in the planning documents sampled? | No | See trip report for explanation. |
| 3. Was a pre-trip calibration conducted as specified in the above named documents? | Yes | |
| 4. Was an operational check of the field equipment conducted twice daily? | Yes | |
| Did the operational checks meet criteria? | Yes | |
| 5. Were the number and types (alkalinity, temperature, Ec, pH, turbidity, DO, ORP) of field measurements taken as specified? | Yes | |
| 6. Was the Category of the well documented? | Yes | |
| 7. Were the following conditions met when purging a Category I well: | | |
| Was one pump/tubing volume purged prior to sampling? | Yes | |
| Did the water level stabilize prior to sampling? | Yes | |
| Did pH, specific conductance, and turbidity measurements stabilize prior to sampling? | Yes | |
| Was the flow rate less than 500 mL/min? | Yes | |
| If a portable pump was used, was there a 4 hour delay between pump installation and sampling? | NA | |

# Water Sampling Field Activities Verification Checklist (continued)

| | Response (Yes, No, NA) | Comments |
|---|---|---|
| 8. Were the following conditions met when purging a Category II well: | | |
| Was the flow rate less than 500 mL/min? | Yes | |
| Was one pump/tubing volume removed prior to sampling? | Yes | |
| 9. Were duplicates taken at a frequency of one per 20 samples? | Yes | |
| 10. Were equipment blanks taken at a frequency of one per 20 samples that were collected with nondedicated equipment? | Yes | |
| 11. Were trip blanks prepared and included with each shipment of VOC samples? | NA | |
| 12. Were QC samples assigned a fictitious site identification number? | Yes | |
| Was the true identity of the samples recorded on the Quality Assurance Sample Log? | Yes | |
| 13. Were samples collected in the containers specified? | Yes | |
| 14. Were samples filtered and preserved as specified? | Yes | |
| 15. Were the number and types of samples collected as specified? | Yes | |
| 16. Were chain of custody records completed and was sample custody maintained? | Yes | |
| 17. Are field data sheets signed and dated by both team members? | Yes | |
| 18. Was all other pertinent information documented on the field data sheets? | Yes | |
| 19. Was the presence or absence of ice in the cooler documented at every sample location? | Yes | |
| 20. Were water levels measured at the locations specified in the planning documents? | Yes | |

## Laboratory Performance Assessment

General Information

Requisition No. (RIN): 05090227
Sample Event: September 28, 2005
Site(s): Moab, Utah
Laboratory: Paragon Analytics
Work Order No.: 0509253
Analysis: Metals and Inorganics
Validator: Steve Donivan
Review Date: November 15, 2005

This validation was performed according to the *Environmental Procedures Catalog* (STO 6), "Standard Practice for Validation of Laboratory Data", GT-9(P). All analyses were successfully completed. The samples were prepared and analyzed using accepted procedures based on methods specified by line item code, which are listed in Table 1. The samples were analyzed concurrently with those from requisitions 05090226 and 05090228. The sample matrix for all samples is equivalent allowing the use of common quality assurance samples.

*Table 1. Analytes and Methods*

| Analyte | Line Item Code | Prep Method | Analytical Method |
|---|---|---|---|
| Uranium, U | GJO-01 | SW-846 3005A | SW-846 6020A |
| Chloride, Cl | MIS-A-039 | SW-846 9056 | SW-846 9056 |
| Sulfate, SO4 | MIS-A-044 | SW-846 9056 | SW-846 9056 |
| Ammonia as N, $NH_3$-N | WCH-A-005 | MCAWW 350.1 | MCAWW 350.1 |
| Total Dissolved Solids, TDS | WCH-A-033 | MCAWW 160.1 | MCAWW 160.1 |

Data Qualifier Summary

Analytical results were qualified as listed in Table 2. The uranium result for sample 0509253-16 is qualified as "U" because the associated calibration blank result is greater than the method detection limit (MDL) and the sample result is less than 5 times the calibration blank result.

*Table 2. Data Qualifiers*

| Sample Number | Location | Analyte | Flag | Reason |
|---|---|---|---|---|
| 0509253-16 | 2983 (Equip Blank) | U | U | Less than 5 times the calibration blank |

Sample Shipping/Receiving

Paragon Analytics in Fort Collins, Colorado, received 16 samples on September 30, 2005, accompanied by a Chain of Custody (COC) form. The COC form was checked to confirm that all of the samples were listed on the form with sample collection dates and times, and that signatures and dates were present indicating sample relinquishment and receipt. The sample submittal documents including the COC form and the sample tickets had no errors or omissions.

Preservation and Holding Times

The sample shipment was received cool and intact with the temperature within the cooler of 0.2°C, which complies with requirements. All samples were received in the correct container types and had been preserved correctly for the requested analyses and all samples were analyzed within the applicable holding times.

Laboratory Instrument Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for all analytes. Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear curve. Compliance requirements for continuing calibration checks are established to ensure that the instrument continues to be capable of producing acceptable qualitative and quantitative data. All laboratory instrument calibrations were performed correctly in accordance with the cited methods.

*Method SW-846 6020*

Calibration for uranium was performed on October 20, 2005. The initial calibration was performed using six calibration standards resulting in a calibration curve with a correlation coefficient ($r^2$) value greater than 0.995. The absolute value of the curve intercept was less than 3 times the MDL. Calibration and laboratory spike standards were prepared from independent sources. Initial and continuing calibration verification (CCV) checks were made at the required frequency resulting in seven CCVs. All calibration check results met the acceptance criteria. A reporting limit verification check was made at the required frequency to verify the linearity of the calibration curve near the practical quantitation limit. The check was within the acceptance criteria range. Mass calibration and resolution verifications were performed at the beginning of each analytical run in accordance with the analytical procedure. Internal standard recoveries were stable and within acceptable ranges.

*Method SW-846 9056*

The initial calibrations for chloride and sulfate were performed using five calibration standards each on September 29, 2005. The calibration curve $r^2$ values were greater than 0.995 and intercepts were less than 3 times the MDL. Initial calibration and calibration check standards were prepared from independent sources. Initial and continuing calibration checks were made at the required frequency resulting in twelve CCVs. The calibration checks met the acceptance criteria.

*Method MCAWW 350.1*

The initial calibrations for ammonia as N was performed using six calibration standards on October 12, 2005 resulting in a calibration curve with a $r^2$ value greater than 0.995 and an intercept less than 3 times the MDL. Initial and continuing calibration checks were made at the required frequency resulting in six CCVs. All calibration check results met the acceptance criteria.

*Method MCAWW 160.1*

There are no calibration requirements associated with the determination of total dissolved solids (TDS).

Method and Calibration Blanks

The uranium initial and continuing calibration blanks (CCB) were below the practical quantitation limits but greater than the MDL. The uranium result for sample 0509253-16 was less than 5 times the concentration of the associated calibration blank and is qualified as "U". The chloride, sulfate, ammonia as N, and TDS method blanks and calibration blanks were below the MDLs with the exception of chloride CCB2 analyzed on October 15, 2005. The samples associated with this CCB were re-analyzed with an acceptable CCB.

Inductively Coupled Plasma Interference Check Sample Analysis

Inductively coupled plasma interference check samples were analyzed at the required frequency to verify the instrumental interelement and background correction factors. All check sample results met the acceptance criteria.

Matrix Spike Analysis

Matrix spike and matrix spike duplicate pairs were analyzed for uranium, chloride, sulfate, and ammonia as N as a measure of method performance in the sample matrix. The spike recoveries met the recovery and precision criteria for all analytes.

Laboratory Replicate Analysis

The relative percent difference (RPD) values for the laboratory replicate sample and matrix spike duplicate sample results for all analytes were less than 20 percent, indicating acceptable laboratory precision.

Laboratory Control Samples

Laboratory control samples were analyzed at the correct frequency to provide information on the accuracy of the analytical method and the overall laboratory performance, including sample preparation. The results were acceptable for all analytes.

Metals Serial Dilution

Serial dilutions were performed during the uranium analysis to monitor physical or chemical interferences that may exist in the sample matrix. The results met the acceptance criteria.

Detection Limits/Dilutions

Samples were diluted in a consistent and acceptable manner when required. The samples were diluted prior to analysis of uranium to reduce interferences. The required detection limits were achieved for all analytes.

Completeness

Results were reported in the correct units for all analytes requested using contract-required laboratory qualifiers.

Chromatography Peak Integration

The integration of analyte peaks was reviewed for all ion chromatography data. There were no manual integrations performed and all peak integrations were satisfactory.

Electronic Data Deliverable File

The electronic data deliverable (EDD) file arrived on November 1, 2005. The Sample Management System EDD validation module was used to verify that the EDD file was complete and in compliance with requirements. The module compares the contents of the file to the requested analyses to ensure all and only the requested data are delivered. The contents of the EDD were manually examined to verify that the sample results accurately reflect the data contained in the sample data package.

## Field Analyses/Activities

The following information summarizes the field activities for this sampling event period.

Field Activities

All monitor well results were qualified with an “F” flag in the database, indicating the wells were purged and sampled using the low-flow sampling method. A duplicate sample was collected from well 0582. There are no established regulatory criteria for the evaluation of field duplicate samples; therefore, U.S. Environmental Protection Agency (EPA) guidance for laboratory duplicates (which is conservative for field duplicates) was used to assess the precision of the field duplicates. Duplicate sample results varied by less than +/-20 RPD and are considered acceptable. An equipment blank was collected and analyzed for the same constituents as the regular water samples. Concentrations measured in the equipment blank were below levels of concern; therefore, equipment blank results are considered acceptable.

## Certification

Results were reported in correct units for all analytes requested, appropriate contract-required laboratory qualifiers and target analyte lists were used, and the required detection limits were met when possible, or an explanation of why they were not met was given in the laboratory case narrative. All analytical quality control criteria were met except as qualified on the Ground Water Quality Data by Parameter, Surface Water Quality by Parameter, or equipment/trip blank database printouts. The meaning of data qualifiers is defined on the database printouts or defined in the EPA Contract Laboratory Program Statement of Work for Inorganic Analysis, Multi-Media Multi-Concentration, Document Number ILMO2.0, 1991. All data in this package are considered validated and may be treated as final results.

Laboratory Validation Lead: Steve Donivan _____ 12-15-05 _____
Steve Donivan Date

Field Activities Validation Lead: J. C. Price _____ 12/15/05 _____
Jeff Price Date

# Attachment 1

# Data Presentation

# Minimums and Maximums Report

## Minimums and Maximums Report

The Minimums and Maximums Report is generated by a data validation application (DataVal) used to query the SEEPro database. The DataVal compares the new data set with historical data and lists all new data that fall outside the historical data range. Values listed in the report are further screened using the following criteria. Results are not considered anomalous if (1) identified low concentrations are the result of low detection limits; (2) the concentration detected is within 50 percent of historical minimum or maximum values; (3) there were fewer than five historical samples for comparison. There were no anomalous data identified from this sampling.

SAMPLING DATA VALIDATION MINIMUMS AND MAXIMUMS REPORT -- No Field Parameters
LAB CODE: PAR, PARAGON (Fort Collins, CO)
LAB REQUISITION(S): 05090227
HISTORY BEGIN DATE: comparing to all historical data
REPORT DATE: 11/23/05 01:43:28: PM

| SITE CODE | LOCATION CODE | SAMPLE DATE | ANALYTE | CURRENT RESULT | CURRENT QUALIFIERS LAB | CURRENT QUALIFIERS DATA | HISTORICAL MAXIMUM RESULT | HISTORICAL MAXIMUM QUALIFIERS LAB | HISTORICAL MAXIMUM QUALIFIERS DATA | HISTORICAL MINIMUM RESULT | HISTORICAL MINIMUM QUALIFIERS LAB | HISTORICAL MINIMUM QUALIFIERS DATA | COUNT N | COUNT N BELOW DETECT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MOA01 | 0590 | 09/28/2005 | Ammonia Total as N | 38 | | QF | 680 | | F | 48 | | FQ | 9 | 0 |

SAMPLE ID CODES: 000X = Filtered sample (0.45 µm). N00X = Unfiltered sample. X = replicate number.

LAB QUALIFIERS:

- * Replicate analysis not within control limits.
- + Correlation coefficient for MSA < 0.995.
- A TIC is a suspected aldol-condensation product.
- B Inorganic: Result is between the IDL and CRDL. Organic & Radiochemistry: Analyte also found in method blank.
- E Inorganic: Estimate value because of interference, see case narrative. Organic: Analyte exceeded calibration range of the GC-MS.
- Z Laboratory defined (USEPA CLP organic) qualifier, see case narrative.
- H Holding time expired, value suspect.
- I Increased detection limit due to required dilution.
- C Pesticide result confirmed by GC-MS.
- M GFAA duplicate injection precision not met.
- N Inorganic or radiochemical: Spike sample recovery not within control limits. Organic: Tentatively identified compund (TIC).
- S Result determined by method of standard addition (MSA).
- U Analytical result below detection limit.
- W Post-digestion spike outside control limits while sample absorbance < 50% of analytical spike absorbance.
- D Analyte determined in diluted sample.
- P > 25% difference in detected pesticide or Arochlor concentrations between 2 columns.
- X Laboratory defined (USEPA CLP organic) qualifier, see case narrative.
- Y Laboratory defined (USEPA CLP organic) qualifier, see case narrative.
- > Result above upper detection limit.
- J Estimated

DATA QUALIFIERS:

- J Estimated value.
- L Less than 3 bore volumes purged prior to sampling.
- U Parameter analyzed for but was not detected.
- F Low flow sampling method used.
- R Unusable result.
- Q Qualitative result due to sampling technique
- G Possible grout contamination, pH > 9.
- X Location is undefined.

# Water Quality Data

GENERAL WATER QUALITY DATA BY PARAMETER (USEE205) FOR SITE MOA01, Moab Site
REPORT DATE: 11/23/2005 1:54 pm

| PARAMETER | UNITS | LOCATION ID | LOC TYPE, SUBTYPE | SAMPLE: DATE | ID | DEPTH RANGE (FT BLS) | RESULT | QUALIFIERS: LAB | DATA | QA | DETECTION LIMIT | UN-CERTAINTY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alkalinity, Total (As CaCO3 | mg/L | 0236 | SL, RIV | 09/28/2005 | 0001 | 0.00 - 0.00 | 146 | | | # | - | - |
| | mg/L | 0240 | SL, RIV | 09/28/2005 | 0001 | 0.00 - 0.00 | 148 | | | # | - | - |
| | mg/L | 0401 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 400 | | F | # | - | - |
| | mg/L | 0408 | WL | 09/28/2005 | 0001 | 26.00 - 26.00 | 206 | | F | # | - | - |
| | mg/L | 0580 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 296 | | F | # | - | - |
| | mg/L | 0581 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 392 | | F | # | - | - |
| | mg/L | 0582 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 265 | | F | # | - | - |
| | mg/L | 0583 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 410 | | F | # | - | - |
| | mg/L | 0584 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 348 | | F | # | - | - |
| | mg/L | 0586 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 310 | | F | # | - | - |
| | mg/L | 0588 | WL | 09/28/2005 | 0001 | 34.00 - 34.00 | 674 | | F | # | - | - |
| | mg/L | 0589 | WL | 09/28/2005 | 0001 | 44.00 - 44.00 | 688 | | F | # | - | - |
| Ammonia Total as N | mg/L | 0236 | SL, RIV | 09/28/2005 | 0001 | 0.00 - 0.00 | 0.1 | U | | # | 0.1 | - |
| | mg/L | 0240 | SL, RIV | 09/28/2005 | 0001 | 0.00 - 0.00 | 0.1 | U | | # | 0.1 | - |
| | mg/L | 0401 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 70 | | F | # | 2 | - |
| | mg/L | 0408 | WL | 09/28/2005 | 0001 | 26.00 - 26.00 | 240 | | F | # | 10 | - |
| | mg/L | 0580 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 24 | | F | # | 0.5 | - |
| | mg/L | 0581 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 110 | | F | # | 20 | - |
| | mg/L | 0582 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 53 | | F | # | 5 | - |
| | mg/L | 0582 | WL | 09/28/2005 | 0002 | 9.78 - 19.71 | 59 | | F | # | 2 | - |
| | mg/L | 0583 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 270 | | F | # | 20 | - |
| | mg/L | 0584 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 210 | | F | # | 20 | - |
| | mg/L | 0586 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 70 | | F | # | 20 | - |
| | mg/L | 0588 | WL | 09/28/2005 | 0001 | 34.00 - 34.00 | 270 | | F | # | 20 | - |
| | mg/L | 0589 | WL | 09/28/2005 | 0001 | 44.00 - 44.00 | 820 | | F | # | 20 | - |
| | mg/L | 0590 | WL, PZ | 09/28/2005 | 0001 | 1.08 - 1.08 | 38 | | QF | # | 2 | - |

GENERAL WATER QUALITY DATA BY PARAMETER (USEE205) FOR SITE MOA01, Moab Site
REPORT DATE: 11/23/2005 1:54 pm

| PARAMETER | UNITS | LOCATION ID | LOC TYPE, SUBTYPE | SAMPLE: DATE | ID | DEPTH RANGE (FT BLS) | RESULT | QUALIFIERS: LAB | DATA | QA | DETECTION LIMIT | UN-CERTAINTY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ammonia Total as N | mg/L | 0591 | WL, PZ | 09/28/2005 | 0001 | 4.22 - 4.22 | 110 | | QF | # | 20 | - |
| Chloride | mg/L | 0236 | SL, RIV | 09/28/2005 | 0001 | 0.00 - 0.00 | 94 | | | # | 4 | - |
| | mg/L | 0240 | SL, RIV | 09/28/2005 | 0001 | 0.00 - 0.00 | 100 | | | # | 4 | - |
| | mg/L | 0401 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 380 | | F | # | 20 | - |
| | mg/L | 0408 | WL | 09/28/2005 | 0001 | 26.00 - 26.00 | 850 | | F | # | 20 | - |
| | mg/L | 0580 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 360 | | F | # | 10 | - |
| | mg/L | 0581 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 850 | | F | # | 20 | - |
| | mg/L | 0582 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 290 | | F | # | 10 | - |
| | mg/L | 0582 | WL | 09/28/2005 | 0002 | 9.78 - 19.71 | 290 | | F | # | 10 | - |
| | mg/L | 0583 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 1200 | | F | # | 20 | - |
| | mg/L | 0584 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 670 | | F | # | 20 | - |
| | mg/L | 0586 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 500 | | F | # | 20 | - |
| | mg/L | 0588 | WL | 09/28/2005 | 0001 | 34.00 - 34.00 | 7400 | | F | # | 100 | - |
| | mg/L | 0589 | WL | 09/28/2005 | 0001 | 44.00 - 44.00 | 23000 | | F | # | 400 | - |
| | mg/L | 0591 | WL, PZ | 09/28/2005 | 0001 | 4.22 - 4.22 | 240 | | QF | # | 10 | - |
| Dissolved Oxygen | mg/L | 0236 | SL, RIV | 09/28/2005 | N001 | 0.00 - 0.00 | 11.52 | | | # | - | - |
| | mg/L | 0240 | SL, RIV | 09/28/2005 | N001 | 0.00 - 0.00 | 11.79 | | | # | - | - |
| | mg/L | 0401 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 3.44 | | F | # | - | - |
| | mg/L | 0408 | WL | 09/28/2005 | N001 | 26.00 - 26.00 | 2.99 | | F | # | - | - |
| | mg/L | 0580 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 3.21 | | F | # | - | - |
| | mg/L | 0581 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 2.48 | | F | # | - | - |
| | mg/L | 0582 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 2.40 | | F | # | - | - |
| | mg/L | 0583 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 3.76 | | F | # | - | - |
| | mg/L | 0584 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 2.68 | | F | # | - | - |
| | mg/L | 0586 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 2.43 | | F | # | - | - |
| | mg/L | 0588 | WL | 09/28/2005 | N001 | 34.00 - 34.00 | 1.85 | | F | # | - | - |

GENERAL WATER QUALITY DATA BY PARAMETER (USEE205) FOR SITE MOA01, Moab Site
REPORT DATE: 11/23/2005 1:54 pm

| PARAMETER | UNITS | LOCATION ID | LOC TYPE, SUBTYPE | SAMPLE: DATE | ID | DEPTH RANGE (FT BLS) | RESULT | QUALIFIERS: LAB | DATA | QA | DETECTION LIMIT | UN-CERTAINTY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dissolved Oxygen | mg/L | 0588 | WL | 09/28/2005 | N001 | 26.00 - 26.00 | 3.32 | | F | # | - | - |
| | mg/L | 0589 | WL | 09/28/2005 | N001 | 52.00 - 52.00 | 0.88 | | F | # | - | - |
| | mg/L | 0589 | WL | 09/28/2005 | N001 | 44.00 - 44.00 | 1.20 | | F | # | - | - |
| | mg/L | 0590 | WL, PZ | 09/28/2005 | N001 | 1.08 - 1.08 | 2.66 | | QF | # | - | - |
| | mg/L | 0591 | WL, PZ | 09/28/2005 | N001 | 4.22 - 4.22 | 2.21 | | QF | # | - | - |
| Oxidation Reduction Potent | mV | 0236 | SL, RIV | 09/28/2005 | N001 | 0.00 - 0.00 | 105 | | | # | - | - |
| | mV | 0240 | SL, RIV | 09/28/2005 | N001 | 0.00 - 0.00 | 120.2 | | | # | - | - |
| | mV | 0401 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 153 | | F | # | - | - |
| | mV | 0408 | WL | 09/28/2005 | N001 | 26.00 - 26.00 | 153 | | F | # | - | - |
| | mV | 0580 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 199 | | F | # | - | - |
| | mV | 0581 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 191 | | F | # | - | - |
| | mV | 0582 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 188 | | F | # | - | - |
| | mV | 0583 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 129 | | F | # | - | - |
| | mV | 0584 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 135 | | F | # | - | - |
| | mV | 0586 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 156 | | F | # | - | - |
| | mV | 0588 | WL | 09/28/2005 | N001 | 26.00 - 26.00 | 74 | | F | # | - | - |
| | mV | 0588 | WL | 09/28/2005 | N001 | 34.00 - 34.00 | 124.8 | | F | # | - | - |
| | mV | 0589 | WL | 09/28/2005 | N001 | 44.00 - 44.00 | 169 | | F | # | - | - |
| | mV | 0589 | WL | 09/28/2005 | N001 | 52.00 - 52.00 | 131 | | F | # | - | - |
| | mV | 0591 | WL, PZ | 09/28/2005 | N001 | 4.22 - 4.22 | 85 | | QF | # | - | - |
| pH | s.u. | 0236 | SL, RIV | 09/28/2005 | N001 | 0.00 - 0.00 | 8.45 | | | # | - | - |
| | s.u. | 0240 | SL, RIV | 09/28/2005 | N001 | 0.00 - 0.00 | 8.59 | | | # | - | - |
| | s.u. | 0401 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 6.90 | | F | # | - | - |
| | s.u. | 0408 | WL | 09/28/2005 | N001 | 26.00 - 26.00 | 6.99 | | F | # | - | - |
| | s.u. | 0580 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 6.93 | | F | # | - | - |
| | s.u. | 0581 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 6.95 | | F | # | - | - |

GENERAL WATER QUALITY DATA BY PARAMETER (USEE205) FOR SITE MOA01, Moab Site
REPORT DATE: 11/23/2005 1:54 pm

| PARAMETER | UNITS | LOCATION ID | LOC TYPE, SUBTYPE | SAMPLE: DATE | ID | DEPTH RANGE (FT BLS) | RESULT | QUALIFIERS: LAB | DATA | QA | DETECTION LIMIT | UN-CERTAINTY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| pH | s.u. | 0582 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 7.36 | | F | # | - | - |
| | s.u. | 0583 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 7.01 | | F | # | - | - |
| | s.u. | 0584 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 7.17 | | F | # | - | - |
| | s.u. | 0586 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 7.11 | | F | # | - | - |
| | s.u. | 0588 | WL | 09/28/2005 | N001 | 34.00 - 34.00 | 7.04 | | F | # | - | - |
| | s.u. | 0588 | WL | 09/28/2005 | N001 | 26.00 - 26.00 | 7.34 | | F | # | - | - |
| | s.u. | 0589 | WL | 09/28/2005 | N001 | 52.00 - 52.00 | 6.76 | | F | # | - | - |
| | s.u. | 0589 | WL | 09/28/2005 | N001 | 44.00 - 44.00 | 6.88 | | F | # | - | - |
| | s.u. | 0590 | WL, PZ | 09/28/2005 | N001 | 1.08 - 1.08 | 9.22 | | QF | # | - | - |
| | s.u. | 0591 | WL, PZ | 09/28/2005 | N001 | 4.22 - 4.22 | 8.85 | | QF | # | - | - |
| Specific Conductance | umhos/cm | 0236 | SL, RIV | 09/28/2005 | N001 | 0.00 - 0.00 | 1709 | | | # | - | - |
| | umhos/cm | 0240 | SL, RIV | 09/28/2005 | N001 | 0.00 - 0.00 | 1171 | | | # | - | - |
| | umhos/cm | 0401 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 9404 | | F | # | - | - |
| | umhos/cm | 0408 | WL | 09/28/2005 | N001 | 26.00 - 26.00 | 11190 | | F | # | - | - |
| | umhos/cm | 0580 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 4125 | | F | # | - | - |
| | umhos/cm | 0581 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 8458 | | F | # | - | - |
| | umhos/cm | 0582 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 3046 | | F | # | - | - |
| | umhos/cm | 0583 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 11250 | | F | # | - | - |
| | umhos/cm | 0584 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 7642 | | F | # | - | - |
| | umhos/cm | 0586 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 4801 | | F | # | - | - |
| | umhos/cm | 0588 | WL | 09/28/2005 | N001 | 34.00 - 34.00 | 29470 | | F | # | - | - |
| | umhos/cm | 0588 | WL | 09/28/2005 | N001 | 26.00 - 26.00 | 4432 | | F | # | - | - |
| | umhos/cm | 0589 | WL | 09/28/2005 | N001 | 44.00 - 44.00 | 62730 | | F | # | - | - |
| | umhos/cm | 0589 | WL | 09/28/2005 | N001 | 52.00 - 52.00 | 85270 | | F | # | - | - |
| | umhos/cm | 0590 | WL, PZ | 09/28/2005 | N001 | 1.08 - 1.08 | 3004 | | QF | # | - | - |
| | umhos/cm | 0591 | WL, PZ | 09/28/2005 | N001 | 4.22 - 4.22 | 3140 | | QF | # | - | - |

GENERAL WATER QUALITY DATA BY PARAMETER (USEE205) FOR SITE MOA01, Moab Site
REPORT DATE: 11/23/2005 1:54 pm

| PARAMETER | UNITS | LOCATION ID | LOC TYPE, SUBTYPE | SAMPLE: DATE | ID | DEPTH RANGE (FT BLS) | RESULT | QUALIFIERS: LAB | DATA | QA | DETECTION LIMIT | UN-CERTAINTY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sulfate | mg/L | 0236 | SL, RIV | 09/28/2005 | 0001 | 0.00 - 0.00 | 320 | | | # | 10 | - |
| | mg/L | 0240 | SL, RIV | 09/28/2005 | 0001 | 0.00 - 0.00 | 340 | | | # | 10 | - |
| | mg/L | 0401 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 1300 | | F | # | 50 | - |
| | mg/L | 0408 | WL | 09/28/2005 | 0001 | 26.00 - 26.00 | 5900 | | F | # | 50 | - |
| | mg/L | 0580 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 1600 | | F | # | 25 | - |
| | mg/L | 0581 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 3500 | | F | # | 50 | - |
| | mg/L | 0582 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 1200 | | F | # | 25 | - |
| | mg/L | 0582 | WL | 09/28/2005 | 0002 | 9.78 - 19.71 | 1200 | N | F | # | 25 | - |
| | mg/L | 0583 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 4400 | | F | # | 50 | - |
| | mg/L | 0584 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 3200 | | F | # | 50 | - |
| | mg/L | 0586 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 1800 | | F | # | 50 | - |
| | mg/L | 0588 | WL | 09/28/2005 | 0001 | 34.00 - 34.00 | 8800 | | F | # | 250 | - |
| | mg/L | 0589 | WL | 09/28/2005 | 0001 | 44.00 - 44.00 | 9600 | | F | # | 500 | - |
| | mg/L | 0591 | WL, PZ | 09/28/2005 | 0001 | 4.22 - 4.22 | 1000 | | QF | # | 25 | - |
| Temperature | C | 0236 | SL, RIV | 09/28/2005 | N001 | 0.00 - 0.00 | 17.21 | | | # | - | - |
| | C | 0240 | SL, RIV | 09/28/2005 | N001 | 0.00 - 0.00 | 19.39 | | | # | - | - |
| | C | 0401 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 17.97 | | F | # | - | - |
| | C | 0408 | WL | 09/28/2005 | N001 | 26.00 - 26.00 | 15.64 | | F | # | - | - |
| | C | 0580 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 17.19 | | F | # | - | - |
| | C | 0581 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 16.17 | | F | # | - | - |
| | C | 0582 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 16.57 | | F | # | - | - |
| | C | 0583 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 16.84 | | F | # | - | - |
| | C | 0584 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 16.55 | | F | # | - | - |
| | C | 0586 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 18.65 | | F | # | - | - |
| | C | 0588 | WL | 09/28/2005 | N001 | 34.00 - 34.00 | 17.27 | | F | # | - | - |
| | C | 0588 | WL | 09/28/2005 | N001 | 26.00 - 26.00 | 17.95 | | F | # | - | - |

GENERAL WATER QUALITY DATA BY PARAMETER (USEE205) FOR SITE MOA01, Moab Site
REPORT DATE: 11/23/2005 1:54 pm

| PARAMETER | UNITS | LOCATION ID | LOC TYPE, SUBTYPE | SAMPLE: DATE | ID | DEPTH RANGE (FT BLS) | RESULT | QUALIFIERS: LAB | DATA | QA | DETECTION LIMIT | UN-CERTAINTY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Temperature | C | 0589 | WL | 09/28/2005 | N001 | 52.00 - 52.00 | 16.31 | | F | # | - | - |
| | C | 0589 | WL | 09/28/2005 | N001 | 44.00 - 44.00 | 16.54 | | F | # | - | - |
| | C | 0590 | WL, PZ | 09/28/2005 | N001 | 1.08 - 1.08 | 22.45 | | QF | # | - | - |
| | C | 0591 | WL, PZ | 09/28/2005 | N001 | 4.22 - 4.22 | 18.40 | | QF | # | - | - |
| Total Dissolved Solids | mg/L | 0236 | SL, RIV | 09/28/2005 | 0001 | 0.00 - 0.00 | 790 | | | # | 40 | - |
| | mg/L | 0240 | SL, RIV | 09/28/2005 | 0001 | 0.00 - 0.00 | 810 | | | # | 40 | - |
| | mg/L | 0401 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 7900 | | F | # | 200 | - |
| | mg/L | 0408 | WL | 09/28/2005 | 0001 | 26.00 - 26.00 | 8900 | | F | # | 200 | - |
| | mg/L | 0580 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 3200 | | F | # | 80 | - |
| | mg/L | 0581 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 6900 | | F | # | 200 | - |
| | mg/L | 0582 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 2200 | | F | # | 80 | - |
| | mg/L | 0582 | WL | 09/28/2005 | 0002 | 9.78 - 19.71 | 2200 | | F | # | 80 | - |
| | mg/L | 0583 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 8100 | | F | # | 200 | - |
| | mg/L | 0584 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 5500 | | F | # | 200 | - |
| | mg/L | 0586 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 3500 | | F | # | 200 | - |
| | mg/L | 0588 | WL | 09/28/2005 | 0001 | 34.00 - 34.00 | 24000 | | F | # | 400 | - |
| | mg/L | 0589 | WL | 09/28/2005 | 0001 | 44.00 - 44.00 | 48000 | | F | # | 2000 | - |
| | mg/L | 0590 | WL, PZ | 09/28/2005 | 0001 | 1.08 - 1.08 | 3100 | | QF | # | 80 | - |
| | mg/L | 0591 | WL, PZ | 09/28/2005 | 0001 | 4.22 - 4.22 | 1800 | | QF | # | 80 | - |
| Turbidity | NTU | 0236 | SL, RIV | 09/28/2005 | N001 | 0.00 - 0.00 | 80.4 | | | # | - | - |
| | NTU | 0240 | SL, RIV | 09/28/2005 | N001 | 0.00 - 0.00 | 73.9 | | | # | - | - |
| | NTU | 0401 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 1.80 | | F | # | - | - |
| | NTU | 0408 | WL | 09/28/2005 | N001 | 26.00 - 26.00 | 16.4 | | F | # | - | - |
| | NTU | 0580 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 2.36 | | F | # | - | - |
| | NTU | 0581 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 22.8 | | F | # | - | - |
| | NTU | 0582 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 4.24 | | F | # | - | - |

GENERAL WATER QUALITY DATA BY PARAMETER (USEE205) FOR SITE MOA01, Moab Site
REPORT DATE: 11/23/2005 1:54 pm

| PARAMETER | UNITS | LOCATION ID | LOC TYPE, SUBTYPE | SAMPLE: DATE | ID | DEPTH RANGE (FT BLS) | RESULT | QUALIFIERS: LAB | DATA | QA | DETECTION LIMIT | UN-CERTAINTY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Turbidity | NTU | 0583 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 4.83 | | F | # | - | - |
| | NTU | 0584 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 20.3 | | F | # | - | - |
| | NTU | 0586 | WL | 09/28/2005 | N001 | 18.00 - 18.00 | 3.06 | | F | # | - | - |
| | NTU | 0588 | WL | 09/28/2005 | N001 | 26.00 - 26.00 | 1.01 | | F | # | - | - |
| | NTU | 0588 | WL | 09/28/2005 | N001 | 34.00 - 34.00 | 1.54 | | F | # | - | - |
| | NTU | 0589 | WL | 09/28/2005 | N001 | 44.00 - 44.00 | 2.42 | | F | # | - | - |
| | NTU | 0589 | WL | 09/28/2005 | N001 | 52.00 - 52.00 | 9.93 | | F | # | - | - |
| | NTU | 0590 | WL, PZ | 09/28/2005 | N001 | 1.08 - 1.08 | 1000 | > | QF | # | - | - |
| | NTU | 0591 | WL, PZ | 09/28/2005 | N001 | 4.22 - 4.22 | 1000 | > | QF | # | - | - |
| Uranium | mg/L | 0236 | SL, RIV | 09/28/2005 | 0001 | 0.00 - 0.00 | 0.010 | | | # | 4.8E-06 | - |
| | mg/L | 0240 | SL, RIV | 09/28/2005 | 0001 | 0.00 - 0.00 | 0.012 | | | # | 4.8E-06 | - |
| | mg/L | 0401 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 1.300 | | F | # | 0.00024 | - |
| | mg/L | 0408 | WL | 09/28/2005 | 0001 | 26.00 - 26.00 | 1.200 | | F | # | 0.00024 | - |
| | mg/L | 0580 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 0.480 | | F | # | 4.8E-05 | - |
| | mg/L | 0581 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 1.100 | | F | # | 0.00024 | - |
| | mg/L | 0582 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 0.330 | | F | # | 2.4E-05 | - |
| | mg/L | 0582 | WL | 09/28/2005 | 0002 | 9.78 - 19.71 | 0.350 | | F | # | 2.4E-05 | - |
| | mg/L | 0583 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 1.300 | | F | # | 0.00024 | - |
| | mg/L | 0584 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 0.820 | | F | # | 4.8E-05 | - |
| | mg/L | 0586 | WL | 09/28/2005 | 0001 | 18.00 - 18.00 | 0.510 | | F | # | 4.8E-05 | - |
| | mg/L | 0588 | WL | 09/28/2005 | 0001 | 34.00 - 34.00 | 2.400 | | F | # | 0.00024 | - |
| | mg/L | 0589 | WL | 09/28/2005 | 0001 | 44.00 - 44.00 | 2.300 | | F | # | 0.00024 | - |
| | mg/L | 0591 | WL, PZ | 09/28/2005 | 0001 | 4.22 - 4.22 | 0.053 | | QF | # | 4.8E-06 | - |

GENERAL WATER QUALITY DATA BY PARAMETER (USEE205) FOR SITE MOA01, Moab Site
REPORT DATE: 11/23/2005 1:54 pm

| PARAMETER | UNITS | LOCATION ID | LOC TYPE, SUBTYPE | SAMPLE: DATE | ID | DEPTH RANGE (FT BLS) | RESULT | QUALIFIERS: LAB | DATA | QA | DETECTION LIMIT | UN-CERTAINTY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

RECORDS: SELECTED FROM USEE200 WHERE site_code='MOA01' AND location_code in('0401','0408','0580','0581','0582','0583','0584','0586','0588','0589','0590','0591','0236','0240') AND quality_assurance = TRUE AND (data_validation_qualifiers IS NULL OR data_validation_qualifiers NOT LIKE '%R%' AND data_validation_qualifiers NOT LIKE '%X%' ) AND DATE_SAMPLED between #9/27/2005# and #9/29/2005#

SAMPLE ID CODES: 000X = Filtered sample (0.45 µm). N00X = Unfiltered sample. X = replicate number.

LOCATION TYPES: SL SURFACE LOCATION WL WELL

LOCATION SUBTYPES: PZ Piezometer RIV River

LAB QUALIFIERS:

| | |
|---|---|
| * | Replicate analysis not within control limits. |
| + | Correlation coefficient for MSA < 0.995. |
| > | Result above upper detection limit. |
| A | TIC is a suspected aldol-condensation product. |
| B | Inorganic: Result is between the IDL and CRDL. Organic & Radiochemistry: Analyte also found in method blank. |
| C | Pesticide result confirmed by GC-MS. |
| D | Analyte determined in diluted sample. |
| E | Inorganic: Estimate value because of interference, see case narrative. Organic: Analyte exceeded calibration range of the GC-MS. |
| H | Holding time expired, value suspect. |
| I | Increased detection limit due to required dilution. |
| J | Estimated |
| M | GFAA duplicate injection precision not met. |
| N | Inorganic or radiochemical: Spike sample recovery not within control limits. Organic: Tentatively identified compund (TIC). |
| P | > 25% difference in detected pesticide or Arochlor concentrations between 2 columns. |
| S | Result determined by method of standard addition (MSA). |
| U | Analytical result below detection limit. |
| W | Post-digestion spike outside control limits while sample absorbance < 50% of analytical spike absorbance. |
| X | Laboratory defined (USEPA CLP organic) qualifier, see case narrative. |
| Y | Laboratory defined (USEPA CLP organic) qualifier, see case narrative. |
| Z | Laboratory defined (USEPA CLP organic) qualifier, see case narrative. |

DATA QUALIFIERS:

| | | | | | |
|---|---|---|---|---|---|
| F | Low flow sampling method used. | G | Possible grout contamination, pH > 9. | J | Estimated value. |
| L | Less than 3 bore volumes purged prior to sampling. | Q | Qualitative result due to sampling technique | R | Unusable result. |
| U | Parameter analyzed for but was not detected. | X | Location is undefined. | | |

QA QUALIFIER: # = validated according to Quality Assurance guidelines.

# Water Level Data

STATIC WATER LEVELS (USEE700) FOR SITE MOA01, Moab Site
REPORT DATE: 11/23/2005 1:54 pm

| LOCATION CODE | FLOW CODE | TOP OF CASING ELEVATION (FT) | MEASUREMENT | | DEPTH FROM TOP OF CASING (FT) | WATER ELEVATION (FT) | WATER LEVEL FLAG |
|---|---|---|---|---|---|---|---|
| | | | DATE | TIME | | | |
| 0401 | O | 3969.60 | 09/28/2005 | 16:57 | 16.55 | 3953.05 | |
| 0408 | O | 3969.17 | 09/28/2005 | 16:39 | 16.10 | 3953.07 | |
| 0580 | | 3969.32 | 09/28/2005 | 13:04 | 16.82 | 3952.50 | |
| 0581 | | 3969.02 | 09/28/2005 | 13:49 | 16.12 | 3952.90 | |
| 0582 | | 3969.65 | 09/28/2005 | 13:21 | 16.68 | 3952.97 | |
| 0583 | | 3969.64 | 09/28/2005 | 15:42 | 16.48 | 3953.16 | |
| 0584 | | 3969.13 | 09/28/2005 | 16:01 | 15.84 | 3953.29 | |
| 0586 | | 3969.20 | 09/28/2005 | 17:19 | 16.44 | 3952.76 | |
| 0588 | | 3969.04 | 09/28/2005 | 15:13 | 15.68 | 3953.36 | |
| 0589 | | 3968.87 | 09/28/2005 | 14:43 | 15.46 | 3953.41 | |
| 0590 | | 3956.70 | 09/27/2005 | 14:33 | 3.65 | 3953.05 | |
| 0591 | | 3953.99 | 09/27/2005 | 14:40 | 1.80 | 3952.19 | |

RECORDS: SELECTED FROM USEE700 WHERE site_code='MOA01' AND location_code in('0401','0408','0580','0581','0582','0583','0584','0586','0588','0589','0590','0591','0236','0240') AND LOG_DATE between #9/27/2005# and #9/29/2005#

FLOW CODES: O ON-SITE

WATER LEVEL FLAGS:

# Blanks

BLANKS REPORT
LAB CODE: PAR, PARAGON (Fort Collins, CO)
LAB REQUISITION(S): 05090227
REPORT DATE: 11/23/05 01:43:09: PM

| PARAMETER | SITE CODE | LOCATION ID | SAMPLE DATE | ID | UNITS | RESULT | QUALIFIERS LAB | QUALIFIERS DATA | DETECTION LIMIT | UNCERTAINTY | SAMPLE TYPE |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ammonia Total as N | MOA01 | 0999 | 09/28/2005 | 0001 | mg/L | 0.1 | U | | 0.1 | | E |
| Chloride | MOA01 | 0999 | 09/28/2005 | 0001 | mg/L | 0.2 | U | | 0.2 | | E |
| Sulfate | MOA01 | 0999 | 09/28/2005 | 0001 | mg/L | 0.5 | U | | 0.5 | | E |
| Total Dissolved Solids | MOA01 | 0999 | 09/28/2005 | 0001 | mg/L | 20 | U | | 20 | | E |
| Uranium | MOA01 | 0999 | 09/28/2005 | 0001 | mg/L | 0.0001 | | U | 0.0000048 | | E |

BLANKS REPORT
LAB CODE: PAR, PARAGON (Fort Collins, CO)
LAB REQUISITION(S): 05090227
REPORT DATE: 11/23/05 01:43:09: PM

| PARAMETER | SITE CODE | LOCATION ID | SAMPLE DATE | ID | UNITS | RESULT | QUALIFIERS LAB | QUALIFIERS DATA | DETECTION LIMIT | UNCERTAINTY | SAMPLE TYPE |
|---|---|---|---|---|---|---|---|---|---|---|---|

SAMPLE ID CODES: 000X = Filtered sample (0.45 µm). N00X = Unfiltered sample. X = replicate number.

LAB QUALIFIERS:

| | |
|---|---|
| * | Replicate analysis not within control limits. |
| + | Correlation coefficient for MSA < 0.995. |
| A | TIC is a suspected aldol-condensation product. |
| B | Inorganic: Result is between the IDL and CRDL. Organic & Radiochemistry: Analyte also found in method blank. |
| E | Inorganic: Estimate value because of interference, see case narrative. Organic: Analyte exceeded calibration range of the GC-MS. |
| Z | Laboratory defined (USEPA CLP organic) qualifier, see case narrative. |
| H | Holding time expired, value suspect. |
| I | Increased detection limit due to required dilution. |
| C | Pesticide result confirmed by GC-MS. |
| M | GFAA duplicate injection precision not met. |
| N | Inorganic or radiochemical: Spike sample recovery not within control limits. Organic: Tentatively identified compund (TIC). |
| S | Result determined by method of standard addition (MSA). |
| U | Analytical result below detection limit. |
| W | Post-digestion spike outside control limits while sample absorbance < 50% of analytical spike absorbance. |
| D | Analyte determined in diluted sample. |
| P | > 25% difference in detected pesticide or Arochlor concentrations between 2 columns. |
| X | Laboratory defined (USEPA CLP organic) qualifier, see case narrative. |
| Y | Laboratory defined (USEPA CLP organic) qualifier, see case narrative. |
| > | Result above upper detection limit. |
| J | Estimated |

DATA QUALIFIERS:

| | | | | | |
|---|---|---|---|---|---|
| J | Estimated value. | F | Low flow sampling method used. | G | Possible grout contamination, pH > 9. |
| L | Less than 3 bore volumes purged prior to sampling. | R | Unusable result. | X | Location is undefined. |
| U | Parameter analyzed for but was not detected. | Q | Qualitative result due to sampling technique | | |

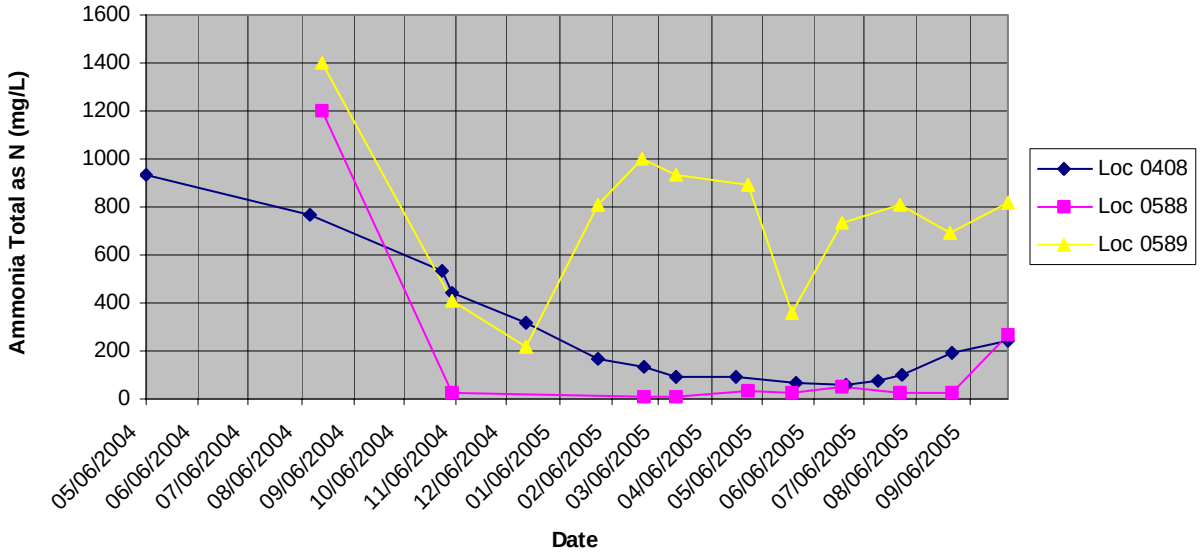
SAMPLE TYPES:

| | |
|---|---|
| E | EQUIPMENT BLANK |

# Time Versus Concentration Graphs

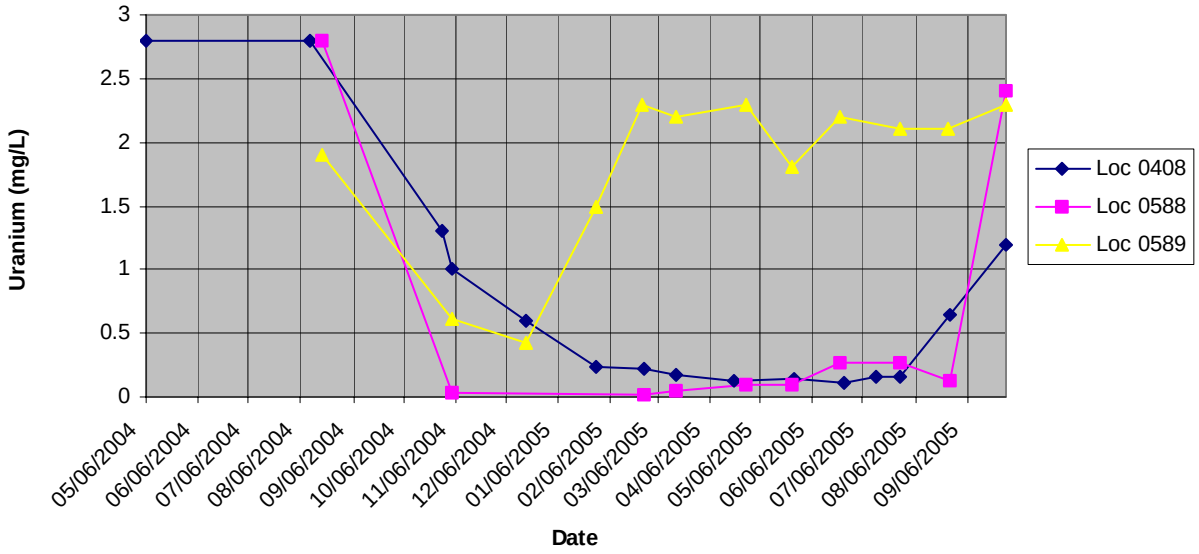
**Moab Site (MOA01)**

**Ammonia Total as N Concentration**




**Moab Site (MOA01)**

**Uranium Concentration**



# Attachment 2

# Trip Report

Stoller

established 1959

DATE: November 3, 2005

TO: John Ford

FROM: K. G. Pill

SUBJECT: Trip Report

**Site:** Moab – Interim Action Configuration 2 Injection Test Sampling – September 2005

**Date of Sampling Event:** September 27 through 29, 2005.

**Team Members:** Ken Pill and Emile Bettez.

**Number of Locations Sampled:** 10 CF2 observation wells (0401, 0408, 0580, 0581, 0582, 0583, 0584, 0586, 0588 [34 ft bgs], and 0589 [44 ft bgs]), 2 piezometers (0590 and 0591), and 2 surface waters (0236 and 0240). Including one equipment blank and one duplicate, a total of 16 samples were collected.

**Locations in Which Field Parameters Were Measured Only:** Field parameters were measured from 5 CF2 observation wells (0402, 0585, 0587, 0588 [26 ft bgs], and 0589 [52 ft bgs]). Samples were not submitted to Paragon for laboratory analysis from these locations.

**Locations Not Sampled/Reason:** There was insufficient volume of water to sample from piezometer 0592, which initially had only 0.2 foot of water inside the piezometer. After this volume was purged, it did not recharge. As a result, no sample was collected from this location. In addition, piezometer 0593 is still buried below approximately 2 to 3 feet of sediment deposited during the 2005 runoff, and was also not sampled. A sample of the injection water (location 0550) was not collected because the fresh water injection supply line was damaged as a result of heavy rainfall during the week this event took place. As a result, no sample was collected.

**Field Variance:** Only a 125 ml sample was collected for uranium analysis as opposed to the standard 500 ml sample volume. No other metals are being sampled, and this volume is sufficient for the uranium analysis. Limited sample volume was available for analysis from locations 0590 and 0591 (approximately 90 and 350 mls, respectively). These samples were split and preserved as directed by the laboratory for proper analysis.

**Quality Control Sample Cross Reference:** Following are the false identifications assigned to the quality control samples:

| False ID | True ID | Sample Type | Associated Matrix | Ticket Number |
|---|---|---|---|---|
| 2982 | 0582 | Duplicate from 18 ft bgs | Ground Water | NDV-821 |
| 2983 | NA | Equipment Blank – GW Equip | DI Water | NDV-854 |

**RIN Number Assigned:** All samples were assigned to RIN **05090227**.

**Sample Shipment:** All samples were shipped in one cooler overnight FEDEX to Paragon Analytics, Inc. from Moab, Utah, on September 29, 2005 (Airbill No. 8527 5847 9097).

**Location Specific Information – CF2 Observation Wells:** All observation wells were sampled using micro-purge techniques with a peristaltic pump and downhole tubing. Sample depths and water levels for each observation well are listed below.

| Well No. | Date | Time | Depth to Water (ft btoc) | Sample Depth (ft bgs) |
|---|---|---|---|---|
| 0401 | 9/28/05 | 16:57 | 16.55 | 18 |
| 0408 | 9/28/05 | 16:39 | 16.10 | 26 |
| 0580 | 9/28/05 | 13:04 | 16.82 | 18 |
| 0581 | 9/28/05 | 13:49 | 16.12 | 18 |
| 0582 | 9/28/05 | 13:21 | 16.68 | 18 |
| 0583 | 9/28/05 | 15:42 | 16.48 | 18 |
| 0584 | 9/28/05 | 16:01 | 15.84 | 18 |
| 0586 | 9/28/05 | 17:19 | 16.44 | 18 |
| 0588 | 9/28/05 | 15:24 | 15.68 | 34 |
| 0589 | 9/28/05 | 14:43 | 15.46 | 44 |

Field parameters (only) were measured from locations 0402, 0585, 0587, 0588 (26 ft bgs), and 0589 (52 ft bgs). These data are presented below with the sample depths (provided in feet below ground surface). These samples were not submitted for laboratory analysis.

| Well No. | Date | Time | Sample Depth (ft bgs) | Depth To Water (ft btoc) | Field Parameters | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Temp ($^{o}$C) | Spec Cond (µS/cm) | D.O. (mg/L) | pH | ORP | Turb. (NTUs) |
| 0402 | 9/28/05 | 14:11 | 17 | 15.66 | 17.68 | 5,147 | 2.23 | 7.10 | 185 | 1.88 |
| 0585 | 9/28/05 | 16:22 | 18 | 16.11 | 17.42 | 5,905 | 2.87 | 7.11 | 140 | 11.6 |
| 0587 | 9/28/05 | 14:24 | 18 | 15.78 | 17.73 | 4,532 | 2.52 | 6.98 | 184 | 4.07 |
| 0588 | 9/28/05 | 15:13 | 26 | 15.68 | 17.95 | 4,432 | 3.32 | 7.34 | 74 | 1.01 |
| 0589 | 9/28/05 | 15:03 | 52 | 15.46 | 16.31 | 85,270 | 0.88 | 6.76 | 131 | 9.93 |

**Location Specific Information – Piezometer Sampling:** Only 0.2 foot of water was present in piezometer 0592. After purging prior to collecting the sample, 0592 never recharged, and it was not possible to collect a sample from this location for analysis. Piezometer 0593 remains under 2 to 3 ft of sediment deposited during the runoff high flows. The table below presents the water level, stick up height, and depth to the river surface for the piezometers prior to the initial purge.

| PZ No. | Date | Time | Depth to Water (ft btoc) | Stick Up Height (ft) | Depth to River Surface (ft btoc) |
|---|---|---|---|---|---|
| 0590 | 9/27/05 | 14:33 | 3.65 | 3.50 | Dry at base |
| 0591 | 9/27/05 | 14:40 | 1.80 | 0.95 | Dry at base |
| 0592 | 9/27/05 | 14:50 | 4.57 | 0.61 | Dry at base |

Approximately 90 mls were submitted for analysis from location 0590. Because of the limited volume, no spilt was available for uranium analysis. Approximately 350 mls were collected from 0591.

**Location Specific Information – Surface Water Sampling:** Location 0236 was first visited on September 27, 2005, at which time there was less than 1 inch of stagnant water present. However, the river stage increased dramatically in response to heavy rain that occurred on the night of September 27. The location was revisited on September 28 and a sample was collected from a depth of approximately 4 inches below the water surface (photo attached).

The same was true for location 0240, which was dry on September 27. This location was also sampled on September 28 from a depth of approximately 3 inches below the surface.

**Location Specific Information – Injection Water Sampling:** The hydrant (location 0550) was not sampled because the injection line was down as a result of flooding in Moab Wash.

**Well Inspection Summary:** A well inspection was not conducted.

**Equipment:** No issues to report.

**Site Issues:** The injection test had been running approximately 33 weeks (since October 6, 2004) prior to having injected water flows reduced in mid-April 2005 in response to the high river stage. The system had been injecting a minimal volume of water approximately 4 months prior this sampling effort.

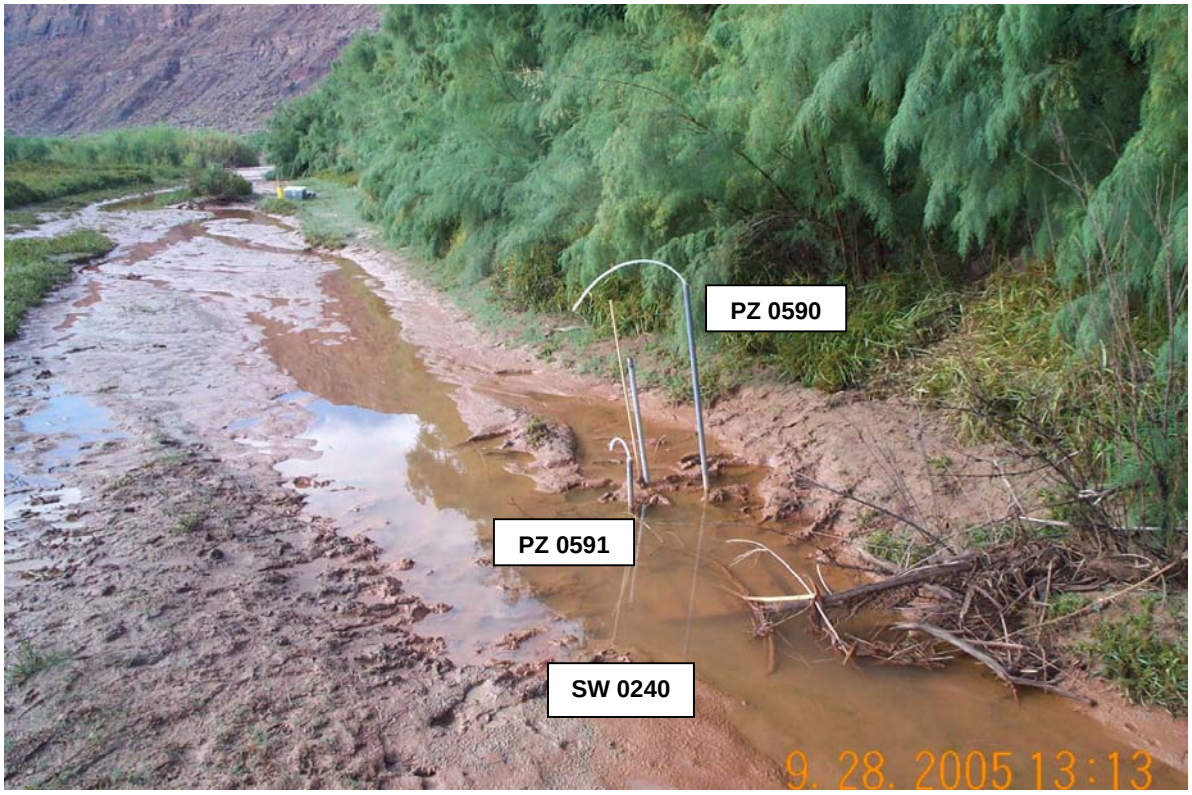
According to the USGS Cisco Gaging Station (Station No. 09180500), the mean daily Colorado River Flows during this sampling event are provided below:

| Date | Daily Mean Flow (cfs) |
|---|---|
| 09/26/2005 | 3,880 |
| 09/27/2005 | 3,740 |
| 09/28/2005 | 5,590 |
| 09/29/2005 | 6,400 |
| 09/30/2005 | 6,210 |
| 10/1/2005 | 5,690 |

**Corrective Action Required/Taken**: None.

(KGP/lcg)

cc: J. D. Berwick, DOE-EM (e)
D. R. Metzler, DOE-EM
C. I. Bahrke, Stoller (e)
L. E. Cummins, Stoller (e)
S. E. Donivan, Stoller (e)
L. M. Edwards, Stoller (e)
K. E. Karp, Stoller (e)
S. D. Lyon, Stoller (e)
K. E. Miller, Stoller
K. G. Pill, Stoller (e)
J. E. Price, Stoller (e)




Piezometers 0590 and 0591, Surface Water 0240


Piezometer 0592


Surface Water Location 0236